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Abstract

This paper focuses on the business system of NC Network, the most successful electronic B-to-B market for the Japanese manufacturing industry.
NC Network provides services such as a search engine based on production technology, a bulletin board that fosters reciprocity, and an infrastructure that highlights unique production technologies to foster adequate competition and to reduce opportunistic behavior. In contrast to unsuccessful electronic markets, NC Network promotes matching, facilitates exchange, and provides solid infrastructure. This demonstrates why a successful electronic market should contain adequate economic and social institutions.
This paper elucidates the business system of a successful electronic market that serves the Japanese manufacturing industry.

Keywords: B-to-B websites, Business System, SME, NC Network

Introduction

Today, electronic markets play an important role in business. Although, many B-to-C websites such as “Amazon.com” have become very successful, B-to-B websites are not so successful, particularly in Japan. Around the end of the 1990s, many B-to-B websites such as O-net were founded in Japan. Gradually, however, these websites disappeared, except for NC network. In a sharp contrast to B-to-B websites’ failure, B-to-C websites such as Rakuten Inc. remain successful.
Japanese manufacturing industries involve a peculiar institution known as “Keiretsu,” which means a long-term contract between a parent company and suppliers that are small and medium-sized enterprises (SMEs). Recently, however, the closed type of B-to-B transaction based on Keiretsu has been confronted with change. The Keiretsu system is getting weaker, and an SME is now able to transact freely and openly with many companies other than its Keiretsu parent. In line with this economic tendency, B-to-B websites have emerged as a tool that promotes an open type of transaction.
Nevertheless, NC Network is the only B-to-B website that is successful. Therefore, this paper attempts to generalize the successful business system for a B-to-B website by shedding light on the case of NC Network.

Transaction Costs and E-Market

Malone et al. [1] predicted a transition from traditional commerce institutions to electronic markets due to reduction in transaction costs. Malone et al. [2] also asserted that as transaction costs fall, market activities increase.
Therefore, electronic markets should naturally replace Keiretsu. The reason is that electronic markets easily provide companies with opportunities to transact beyond the walls of their Keiretsu. Many companies can thereby obtain the benefit of an open market, which consequently promotes the superior matching of companies.
The Keiretsu system’s advantage is that the long-term relationship between a parent company and its suppliers develops trust and eliminates the need to search for a new partner, which is a form of transaction cost. However, the disadvantage of Keiretsu promotes collusion and complacency because a supplier is not able to transact with other companies openly in order to find a superior fit. Although Keiretsu has this disadvantage, both the parent company and its suppliers gravitate toward the advantage and hesitate to break the system. Before the advent of the internet, a transition to the open market would inevitably entail a high transaction cost, as known in traditional market economics.
Lee and Clark [3] pointed out that electronic markets lead to the reduction of transaction costs. This is because electronic markets bring companies together with low searching costs, and one would expect subcontractor companies to make full use of electronic markets instead of Keiretsu.

Institutions for E-Markets

According to some economic theorists, the market itself cannot achieve anything without institutions. Macmillan [4] asserted that in order to facilitate transactions, markets should have adequate institutions. Entrepreneurs cannot make proper deals

and gain market benefits unless adequate institutions such as regulations are established.

In addition, Putnam [5] raised points about the inherent flaws of information technology. First, people can enter and exit cyberspace so easily that many of them do not develop a reciprocal relationship which leads to exchange. Second, people are confronted with a flood of information in cyberspace, and so they cannot efficiently find the right information. Lacking an institution which facilitates the access of heterogeneous information sources, people tend to rely on the familiarity of homogeneous information sources. This cocoon-like phenomenon weakens the potential of electronic markets. Third, cyberspace is open to free riders. Putnam regards the lack of reciprocal relationship as the most important. His conclusion notes the importance of social capital in electronic markets. Therefore, in order to cultivate social capital, institutions are needed.

Macmillan [4] primarily refers to economic aspects, while Putnam [5] focuses on social aspects. However, both writers agree on the importance of institutions. Therefore, in order to promote website business (both B-to-B and B-to-C), electronic markets should be equipped with a business system which contains adequate economic and social institutions.

According to Whitley [6], a "business system" is something that includes effective forms of business organization and their interdependence with key institutions. In this context, the term "institution" refers to economic and social aspects, such as market mechanism and culture. This paper calls attention to the fact that a business system for electronic markets has a huge effect on registered companies' management operations. Especially in regard to B-to-B, coping with an electronic market service's business system, requires a registered company to adapt its strategy and management. For example, if an electronic market uses a business system that leads registered companies to compete according to the criterion of price, those companies would thereby be encouraged to cut costs in order to participate adequately in this particular electronic market's environment, namely a price war. On the other hand, if an electronic market's business system leads registered companies to compete according to the criterion of high technology (i.e., technological innovation), those companies should improve their use of technology and develop creative applications. Traditional assumptions about business systems are not adequate for B-to-B electronic markets.

In this paper, I explore the reciprocal relationship between an electronic market service company and its registered companies, from the viewpoint of the business system. Before analyzing the business systems of B-to-B websites, it is necessary to review and refine the analytical framework.

Analytical Framework

Thus far, I have described how electronic markets provide an opportunity for open transaction beyond the walls of Keiretsu. In addition, I have explained that an e-market needs a business system that contains adequate economic and social institutions.

Bakos [7] elaborated a framework that is nearly in agreement with my paper's topic. He asserted that e-markets have three main functions: match buyers with sellers; facilitate the exchange of information, goods, services, and payments associated with transactions; and provide an institutional infrastructure, such as a legal and regulatory framework. However, Bakos only paid attention to economic institutions, not social institutions. Therefore, my paper modifies his analytical framework as follows.

1. Promote Matching: an electronic market should be equipped with a user-friendly search engine.
2. Facilitate an Exchange: an electronic market should facilitate the exchange of goods and information among its registered companies.
3. Provide Infrastructure: an electronic market should have regulations to discourage free riders.

Employing this framework, this paper analyzes the business system of electronic markets that contain economic and social institutions.

This paper adopts the case study as its research methodology. According to Yin [8], the case study is the most appropriate method for determining the causal relationship between success factors and effects when contrasting successful and failed research subjects (i.e., websites).

Analysis

NC Network was founded in 1998 by Mr. Uchihara, who was the executive director of an SME. Consequently, he was very familiar with Japanese manufacturing and the position of SMEs in the industry. He founded an electronic market for SMEs that were then serving as subcontractors for large manufacturing companies (parent companies) under the Keiretsu system. This electronic transaction organizer, NC Network, responded to the initiative of suppliers. The number of its registered companies increased steadily and it became Japan's largest coordination website for electronic transactions, with more than 13,000 registered companies. NC Network strongly emphasized collaboration among suppliers beyond the walls of Keiretsu and even strived to encourage deals far beyond the hierarchy of makers (parent companies), primary suppliers, and secondary suppliers. The specific services it provided to realize this ideal is shown in Table 1.

In this e-market, both large manufacturing companies and SMEs benefit. For example, using NC Network,

a large automobile company was able to develop and manufacture a biped walking robot. In addition, a small company received many orders from various industries beyond the walls of its Keiretsu parent company's business sector.

NC Network launched a number of services. First, it enables suppliers to search for specified techniques possessed by vendors in various sectors. The search engine, EMIDAS, accesses more than 13,000 registered vendors. The suppliers can narrow their search from general classifications (such as mold designing, machine manufacturing, and metal casting), down to more precise classifications (such as metal cast designing and industrial equipment), and eventually down to a specific trade such as press cast designing. The users can enter specific requirements and be directed to the websites of suppliers who meet those requirements (see Figure 1). The results from the search engine are presented in a sequence based on the excellence of technology and an ongoing record of previous orders (user feedback). For example, if I search micro-machining, more than 100 vendors are hit on the search result. However, the sequence of these vendors is based on the criteria of excellence of technology and a record of previous orders. Therefore the registered companies with excellent technology and high reputation will be shown at the top of search results while the ones with low technology and bad reputation will seldom attract attentions.

NC Network also launched a service called the Excellent and Unique Technology Pick Up. This service aims to boost orders for high value-added products by introducing vendors' unique techniques to manufacturers and suppliers in diverse industrial sectors, thereby enabling manufacturers and suppliers to make their own evaluations. For example, some suppliers describe manufacturing operations with extremely tight deadlines while others promote their own micro-machining of aluminum materials. What is important about these actions is that the suppliers do not intend to engage into sales battles; they simply provide their technical information and then wait for high value-added orders to come to them.

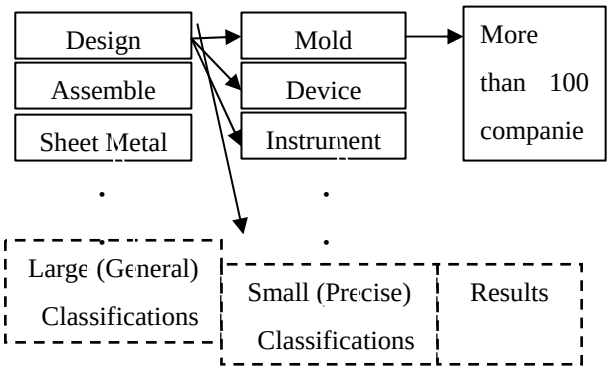
In addition, NC Network provides a service called Forest of Technology, which is a bulletin board on which any registered member can ask for technical advice from suppliers throughout their entire types of industry. When suppliers handle orders from various industries, they may have trouble due to differences among the industries. For example, if a supplier dealing with mobile phones receives an order from an automobile company, it will probably have to struggle to make components appropriate to the design of the automobile that are larger than the usual components of its mobile phone. These differences across the boundaries of industries are a serious hurdle for small companies when transacting with diverse companies. Therefore, the Forest of Technology enables the suppliers to cope by discussing these differences. Further, this bulletin board sometimes leads to new transactions as a result of someone providing technical advice. For example, when a medical equipment company asked for advice about precision machines, a supplier provided information. Through this consulting, the two parties were able to establish trust and consequently they began to transact with each other.

EMIDAS	This is not a mediator of components or devices, but a search engine of more than 13,000 registered suppliers as potential partners for processing classification. We can search for potential partners based on set conditions ranging from large classifications to small classifications. Search results showed homepages of suppliers that meet conditions we set. So we can not only search for components or devices, but also new technical partners.
Excellent and Unique Technology Pick Up	This is a service that introduces suppliers' skillful or unique technologies accompanied by pictures and letters. We can also search for technology by keywords. This service helps suppliers disclose their skillful or unique technologies to draw many orders.
Forest of Technology	This is the bulletin board on which every registered member can ask for technical advice from various suppliers of various industry. Some queries that are answered on the bulletin board help in solving the technical problem.

<Table 1 NC Network Services>

From Matsushima et al. [9]

<Figure 1 EMIDAS>



Discussion

The first advantage of the NC Network business system is its search engine. Instead of being based on the criterion of product, it provides results based on the processing technology. Due to this criterion, a user company can find any registered company because the search crosses various industries. Therefore, an automobile component company was able to develop a low-cost clutch by ordering some components from a home electronics company. The other electronic markets, which were unsuccessful, had their search engines based on the criterion of the end product. In fact, most of the registered companies are subcontractors who have been tied to a single industry, so they have never manufactured components for another industry. However, some of these subcontractors have the skill and ability to manufacture diverse components. A search engine based on the criterion of the product cannot discover such companies because they will not appear as search hits for products that they have never made before. NC Network succeeded because it has an adequate search engine.

The second advantage of NC Network is its service for exchanging goods and information among its registered companies. Although it does not actually involve goods exchange, its service leads to goods exchange, and the NC Network does facilitate the exchange of information among its registered companies. Through its Excellent and Unique Technology Pick Up service, registered companies can be made aware about cutting edge processing technology. Then, they can know about their competitors and decide on actions for the future. Therefore, the registered companies compete with each other based on their unique technologies. For example, when a company showed a few microns processing technology on Excellent and Unique Technology Pick Up service, another company tried to develop smaller processing technology. Then registered companies compete based on excellent and unique processing technology. Further using the Forest of Technology, registered companies can obtain technical knowledge relevant to various industries. This bulletin board promotes reciprocal relationship among registered companies as social institution.

The third advantage of NC Network is its transaction infrastructure. EMIDAS shows search results based on the criteria of excellence of technology and a record of previous orders. Users of the search engine can thereby avoid low technical or free rider companies because they will not appear as search hit. The Excellent and Unique Technology Pick Up service also helps screen results because it introduces only technical excellent companies. Together, these two services function as a kind of economic institution that can be substituted for legalistic regulations. The fundamental principle is that registered companies must compete on the basis of high quality and unique processing technology if they want to use the e-market to boost their high value-added orders. In order to boost high value-added orders, NC Network excludes bad-reputation companies from search engine. If searchers transact low technical or free rider companies via NC Network, they will never order high value-added orders next time. In addition, the Forest of Technology enables suppliers to cope with technical difficulties when expanding their business into diverse industries. This aspect of mutual assistance is also important for the infrastructure of an electronic market.

Bakos [10] asserted that electronic markets enable buyers to benefit from low searching cost (a kind of transaction cost), but sellers are confronted with price wars. Therefore, most electronic markets in Japan were unsuccessful, because SMEs were reluctant to join. However, the business system of NC Network avoids price wars and facilitates competition on the bases of high quality and unique processing technology, which leads to high value-added orders, thereby benefiting skillful SMEs and attracting them to join. This paper sheds light on electronic markets as a resource for the recombination of networks [11], which manifests as transactions beyond walls of Keiretsu.

Conclusion

Unless adequate economic and social institutions are shaped by e-market founder and registered companies, no one can gain market benefits in the electronic market. Therefore this paper focuses on three functions of the business system in a successful electronic market (NC Network).

NC Network promotes matching by providing an adequate search engine. The search criterion is not based on the product but on the processing technology.

NC Network aggressively promotes information exchange about unique techniques among its registered companies. Through the bulletin board, registered companies can obtain technical information about various industries and friendly advice.

In addition, NC Network provides the necessary infrastructure for open transactions. By utilizing the increased competitiveness brought about by high technology in its registered companies, NC Network screens technical companies and prevents the opportunistic behavior of free riders.

NC Network has constructed a successful business system, which contains economic institutions to reduce opportunistic behavior, and also social

institutions that foster reciprocal relationships. The business system of NC Network facilitates open transactions in an electronic market.

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